7.1 Exercises

Name the quadrant in which each point is located.

1. (1, 5) **2.** (−2, 4) **3.** (−3, −2) **4.** (5, −1)
5. (2, −3) **6.** (−7, −4) **7.** (−1, 4) **8.** (0, 4)

Locate the following points on a rectangular coordinate system.

9. (2, 3) **10.** (−1, 2) **11.** (−3, −2) **12.** (1, −4)
13. (0, 5) **14.** (−2, −4) **15.** (−2, 4) **16.** (3, 0)
17. (−2, 0) **18.** (3, −3)

In each exercise, complete the given ordered pairs for the equation. Then graph the equation. See Example 1.

19. $2x + y = 5$; (0,), (, 0), (1,), (, 1)
20. $3x - 4y = 24$; (0,), (, 0), (6,), (, −3)
21. $x - y = 4$; (0,), (, 0), (2,), (, −1)
22. $x + 3y = 12$; (0,), (, 0), (3,), (, 6)
23. $4x + 5y = 20$; (0,), (, 0), (3,), (, 2)
24. $2x - 5y = 12$; (0,), (, 0), (, −2), (−2,)
25. $3x + 2y = 8$; (0,), (, 0), (2,), (, −2)
26. $5x + y = 12$; (0,), (, 0), (, −3), (2,)

For each equation, find the x-intercept and the y-intercept. Then graph the equation. See Examples 2–5.

27. $3x + 2y = 12$ **28.** $2x + 5y = 10$ **29.** $5x + 6y = 10$ **30.** $3y + x = 6$
31. $2x - y = 5$ **32.** $3x - 2y = 4$ **33.** $x - 3y = 2$ **34.** $y - 4x = 3$
35. $y + x = 0$ **36.** $2x - y = 0$ **37.** $3x = y$ **38.** $x = -4y$
39. $x = 2$ **40.** $y = -3$ **41.** $y = 4$ **42.** $x = -1$

7.2 Exercises

Graph the line through each pair of points. Find the slope in each case. See Example 1.

1. (2, −3) and (1, 5) **2.** (4, −1) and (−2, −6) **3.** (6, 3) and (5, 4)

4. (6, −2) and (5, 1) **5.** (3, 3) and (−5, −6) **6.** (1, 2) and (−4, 6)

7. (2, 5) and (−4, 5) **8.** (−4, 2) and (−4, 8)

Find the slope of each of the following lines, and sketch the graph. See Examples 1 and 2.

9. $2x + 4y = 5$ **10.** $3x - 6y = 12$ **11.** $-x + y = 5$

12. $x + y = 1$ **13.** $6x - 5y = 30$ **14.** $4x + 3y = 12$

Use the method of Examples 4 and 5 in the text to graph each of the following lines.

15. $m = \frac{1}{2}$, through (−3, 2) **16.** $m = \frac{2}{3}$, through (0, 1)

17. $m = -\frac{5}{4}$, through (−2, −1) **18.** $m = -\frac{3}{2}$, through (−1, −2)

19. $m = -2$, through (−1, −4) **20.** $m = 3$, through (1, 2)

21. $m = 0$, through (2, −5) **22.** Undefined slope, through (−3, 1)

23. Undefined slope, through (−4, 1) **24.** $m = 0$, through (5, 3)

Decide which pairs of lines are parallel. See Example 6.

25. $3x = y$ and $2y - 6x = 5$ **26.** $2x + 5y = -8$ and $6 + 2x = 5y$

27. $4x + y = 0$ and $5x - 8 = 2y$ **28.** $x = 6$ and $6 - x = 8$

29. The line through (4, 6) and (−8, 7) and the line through (7, 4) and (−5, 5)

30. The line through (9, 15) and (−7, 12) and the line through (−4, 8) and (−20, 5)

Decide which pairs of lines are perpendicular. See Example 7.

31. $4x - 3y = 8$ and $4y + 3x = 12$ **32.** $2x = y + 3$ and $2y + x = 3$

33. $4x - 3y = 5$ and $3x - 4y = 2$ **34.** $5x - y = 7$ and $5x = 3 + y$

35. $2x + y = 1$ and $x - y = 2$ **36.** $2y - x = 3$ and $y + 2x = 1$

Use slope to decide whether each group of three points lies on the same line. See Example 8.

37. (1, 3), (−2, 9), (4, −2) **38.** (6, −1), (−2, −5), (4, −2)

39. (3, 4), (−2, −1), (2, 3) **40.** (−1, 2), (−3, −1), (5, 2)

Solve the following problems using your knowledge of the slopes of parallel and perpendicular lines.

41. Show that (−13, −9), (−11, −1), (2, −2), and (4, 6) are the vertices of a parallelogram. (*Hint:* A parallelogram is a four-sided figure with opposite sides parallel.)

42. Is the figure with vertices at (−11, −5), (−2, −19), (12, −10), and (3, 4) a parallelogram? Is it a rectangle? (A rectangle is a parallelogram with a right angle.)

7.3 Exercises

Write the following equations in slope-intercept form, and then find the slope of the line and the y-intercept. See Example 1.

1. $x + y = 8$ **2.** $x - y = 2$ **3.** $5x + 2y = 10$ **4.** $6x - 5y = 18$

5. $2x - 3y = 5$ **6.** $4x + 3y = 10$ **7.** $-5x - 3y = 4$ **8.** $-2x - 7y = 15$

9. $8x + 11y = 9$ **10.** $4x + 13y = 19$

Find equations of the lines satisfying the following conditions. Write the equations in slope-intercept form. See Example 2.

11. $m = 5, \quad b = 4$ **12.** $m = -2, \quad b = 1$

13. $m = -\frac{2}{3}, \quad b = \frac{1}{2}$ **14.** $m = -\frac{5}{8}, \quad b = \frac{1}{4}$

15. Slope $\frac{2}{5}$, y-intercept -1 **16.** Slope $-\frac{3}{4}$, y-intercept 2

17. Slope 0, y-intercept 4 **18.** Slope 0, y-intercept -3

19. Slope -1.573, y-intercept 4.209 **20.** Slope -2.334, y-intercept 0.532

Find equations of the lines satisfying the following conditions. Write the equations in standard form. See Example 3.

21. $m = -\frac{3}{4}$, through $(-2, 5)$ **22.** $m = -\frac{5}{6}$, through $(4, -3)$

23. $m = -2$, through $(1, 5)$ **24.** $m = 1$, through $(-2, 3)$

25. $m = \frac{1}{2}$, through $(7, 4)$ **26.** $m = \frac{1}{4}$, through $(1, -2)$

27. Horizontal, through $(-3, 2)$ **28.** Vertical, through $(1, 5)$

29. $m = 4$, x-intercept 3 **30.** $m = -5$, x-intercept -2

31. $m = 1.2538$, through $(4.1642, 2.9371)$ **32.** $m = -0.4093$, through $(1.6847, 3.2501)$

Find equations for the following lines. (Hint: What kind of line has undefined slope?)

33. Undefined slope, through $(2, 8)$ **34.** Undefined slope, through $(-4, 1)$

35. Vertical, through $(-7, 1)$ **36.** Vertical, through $(3, -9)$

Find equations of the lines passing through the following pairs of points. Write the equations in standard form. See Example 4.

37. $(3, 4)$ and $(2, 6)$ **38.** $(5, -2)$ and $(-3, 1)$ **39.** $(6, 1)$ and $(-2, 5)$

40. $(4, -2)$ and $(1, 3)$ **41.** $(1, 1)$ and $(0, -4)$ **42.** $(3, -4)$ and $(-2, 2)$

43. $\left(-\frac{2}{5}, \frac{2}{5}\right)$ and $\left(\frac{4}{3}, \frac{2}{3}\right)$ **44.** $\left(\frac{3}{4}, \frac{8}{3}\right)$ and $\left(\frac{2}{5}, \frac{2}{3}\right)$ **45.** $(2, 5)$ and $(1, 5)$

46. $(-2, 2)$ and $(4, 2)$ **47.** $(1, \sqrt{5})$ and $(3, 2\sqrt{5})$ **48.** $(-4, \sqrt{2})$ and $(5, -\sqrt{2})$

Find equations of the lines satisfying the following conditions. Write the equations in standard form. See Examples 5 and 6.

49. Parallel to $3x - y = 8$ and through $(-7, 3)$

50. Parallel to $2x + 5y = 10$ and through $(4, 7)$

51. Parallel to $-x + 2y = 3$ and through $(-2, -2)$

52. Through $(-1, 3)$ and perpendicular to $3x + 2y = 6$

53. Through $(8, 5)$ and perpendicular to $2x - y = 4$

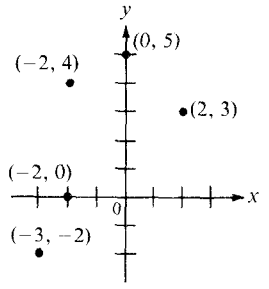
54. Through $(2, -7)$ and perpendicular to $5x + 2y = 7$

55. Parallel to $y = 4$ and through $(-2, 7)$

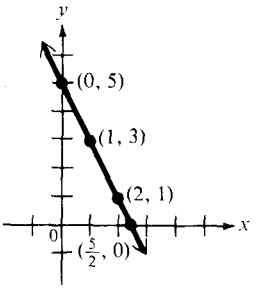
56. Parallel to $x - 2 = 0$ and through $(8, 4)$

1. I **3.** III **5.** IV **7.** II

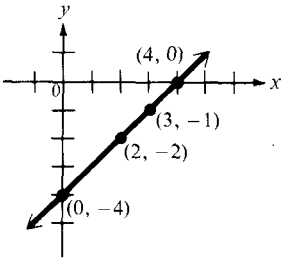
9–17.



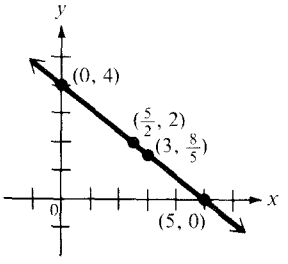
19. (0, 5), (5/2, 0), (1, 3), (2, 1)



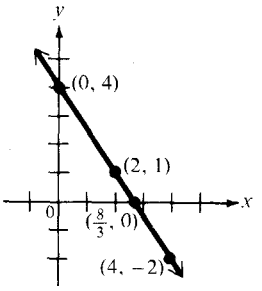
21. (0, −4), (4, 0), (2, −2), (3, −1)



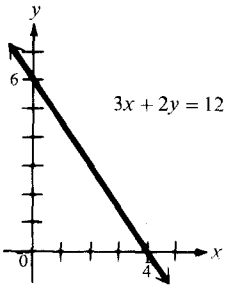
23. (0, 4), (5, 0), (3, 8/5), (5/2, 2)



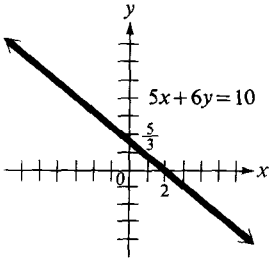
25. (0, 4), (8/3, 0), (2, 1), (4, −2)



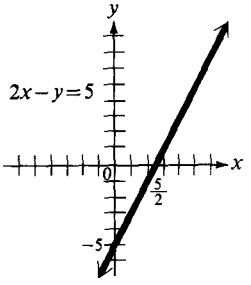
27. 4; 6



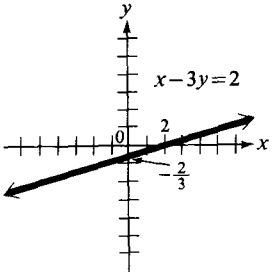
29. 2; 5/3



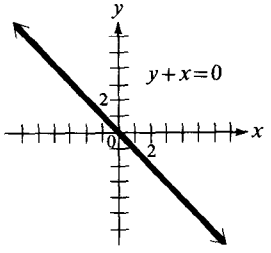
31. 5/2; −5



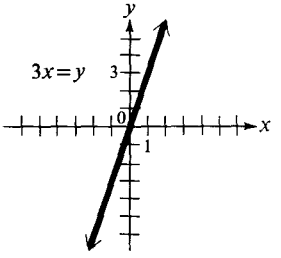
33. 2; −2/3



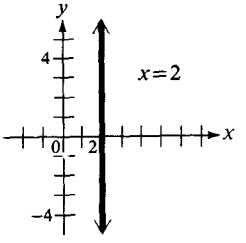
35. 0; 0



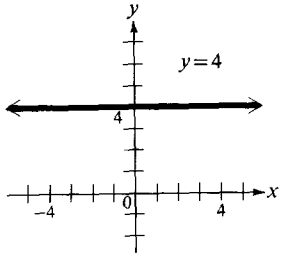
37. 0; 0



39. 2; none

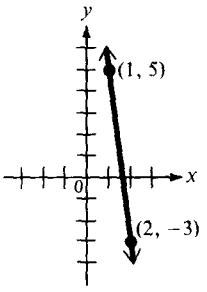


41. None; 4

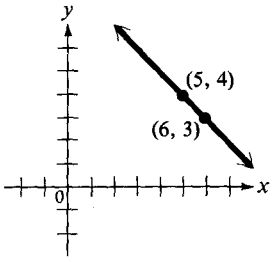


Section 7.2 (page 305)

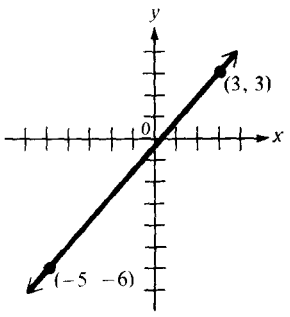
1. $m = -8$



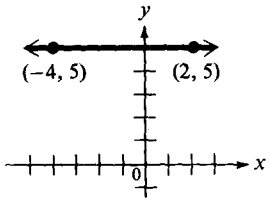
3. $m = -1$



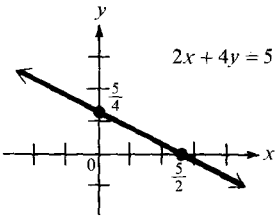
5. $m = 9/8$



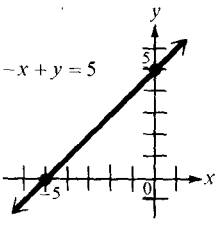
7. $m = 0$



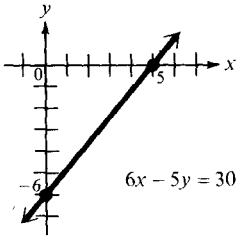
9. $m = -1/2$



11. $m = 1$



13. $m = 6/5$



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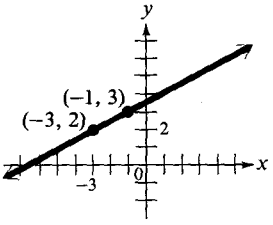

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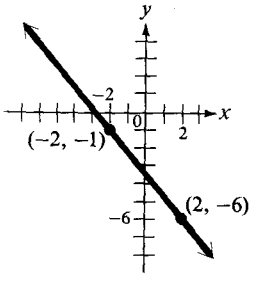

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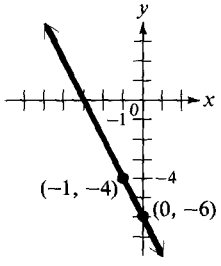

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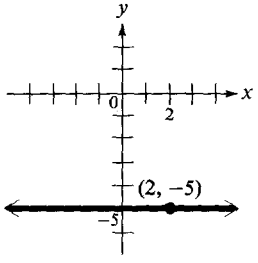

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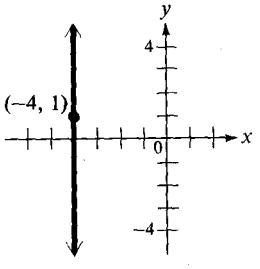

25. Parallel **27.** Not parallel **29.** Parallel **31.** Perpendicular **33.** Not perpendicular **35.** Not perpendicular **37.** No **39.** Yes **41.** Since the slopes of opposite sides are equal, the figure is a parallelogram **43.** Approximately .92°C **45.** \$1.40 **47.** $y = (8 - 2x)/3$ **49.** $y = (7 - 3x)/4$ **51.** $3y = -2x + 27$ **53.** $3y = 5x + 17$

Section 7.3 (page 311)

1. $y = -x + 8$; -1; 8 **3.** $y = (-5/2)x + 5$; $-5/2$; 5 **5.** $y = (2/3)x - 5/3$; $2/3$; $-5/3$ **7.** $y = (-5/3)x - 4/3$; $-5/3$; $-4/3$ **9.** $y = (-8/11)x + 9/11$; $-8/11$; $9/11$ **11.** $y = 5x + 4$ **13.** $y = (-2/3)x + 1/2$ **15.** $y = (2/5)x - 1$ **17.** $y = 4$ **19.** $y = -1.573x + 4.209$ **21.** $3x + 4y = 14$ **23.** $2x + y = 7$ **25.** $x - 2y = -1$ **27.** $y = 2$ **29.** $4x - y = 12$ **31.** $1.2538x - y = 2.2840$ (rounded) **33.** $x = 2$ **35.** $x = -7$ **37.** $2x + y = 10$ **39.** $x + 2y = 8$ **41.** $5x - y = 4$ **43.** $2x - 13y = -6$ **45.** $y = 5$ **47.** $\sqrt{5}x - 2y = -\sqrt{5}$ **49.** $3x - y = -24$ **51.** $x - 2y = 2$ **53.** $x + 2y = 18$ **55.** $y = 7$

57. (a) $y = 640x + 1100$ (b) \$8780 **59.** (a) $y = \frac{4400}{3}x - \frac{94{,}100}{3}$ (b) \$12,633.33

61. $(-\infty, 1/2)$ **63.** $[-2, +\infty)$ **65.** $(-\infty, -8/5)$